DOCUMENT RESUME

ED 231 747 SO 014 987

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TITLE The Impact of the Micro on Social Studies Curricula or Computer Assisted Learning (CAL) in Economics, History, and Geography Curricula in England, Wales and Northern Ireland.
PUB DATE Jun 83
NOTE 22p.; Paper presented at the Annual Conference of the Social Science Education Consortium, Inc., (20th, Athens, GA, June 8-11, 1983). Best copy available.
PUB TYPE Information Analyses (070) -- Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Comparative Education; *Computer Assisted Instruction; *Curriculum Development; Economics Education; Educational Research; Elementary Secondary Education; *Federal Aid; Foreign Countries; Geography Instruction; History Instruction; Literature Reviews; Microcomputers; Program Descriptions; Research Needs; *Social Studies; Technological Advancement
IDENTIFIERS Computer Uses in Education; *Great Britain

ABSTRACT

Government initiatives for incorporating microcomputers in the schools in England, Wales, and Northern Ireland as well as the availability of and attitudes toward computer assisted learning (CAL) in secondary school geography, economics, and history are discussed. In 1980, the government launched the Microelectronics Education Programme to support curriculum development, teacher training, and resource organization. The program has set up 14 regional information centers where inservice training is conducted and has financially supported various agencies to engage in software development. By the end of 1983, every secondary school in England will have a microcomputer. In history, economics, and geography instruction, CAL consists of information handling; statistical analysis; simulation; reinforcement of knowledge, skills, and ideas; production of teaching materials; and management of resources and learning. Of the three subjects, geography has sustained CAL developments on the widest scale. Many history teachers regard CAL as no more than a gimmick. In economics, much software has been promised, but little produced. Most teachers have decided against using CAL since there is not enough hardware or software available. Teacher awareness and knowledge is limited, and sparse research suggests that less able students may have negative attitudes toward CAL. Thus, inservice training is critical to the success of CAL. (KC)

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THE IMPACT OF THE MICRO ON SOCIAL STUDIES CURRICULA OR COMPUTER ASSISTED LEARNING (CAL) IN ECONOMICS, HISTORY AND GEOGRAPHY CURRICULA IN ENGLAND, WALES AND NORTHERN IRELAND

by

Ashley Kent

Paper presented at the Annual Conference of the Social Science Education Consortium, Inc., (20th, Athens, GA, June 8-11, 1983).

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THE IMPACT OF THE MICRO ON SOCIAL STUDIES CURRICULA

OR COMPUTER ASSISTED LEARNING (CAL)

IN ECONOMICS, HISTORY AND GEOGRAPHY CURRICULA IN

ENGLAND, WALES AND NORTHERN IRELAND.

The first title is the one the author submitted several months ago. The second title rather more accurately reflects the contents of this paper! Scotland is not considered since it has its own Microelectronics Education Programme, in existence since 1980.[1] The other point of clarification in the second title is the specification of economics, history and geography as the subjects covered by the term social studies. In England, Wales and Northern Ireland, the secondary schools[2] often have separately timetabled slots for those three subjects. The final point by way of introduction, is that the focus of the paper is on secondary level computer assisted learning (CAL). This is the umbrella term[3] increasingly being used in England, Wales and Northern Ireland* for the whole range of uses in which a computer can be put to support teaching and learning activities.

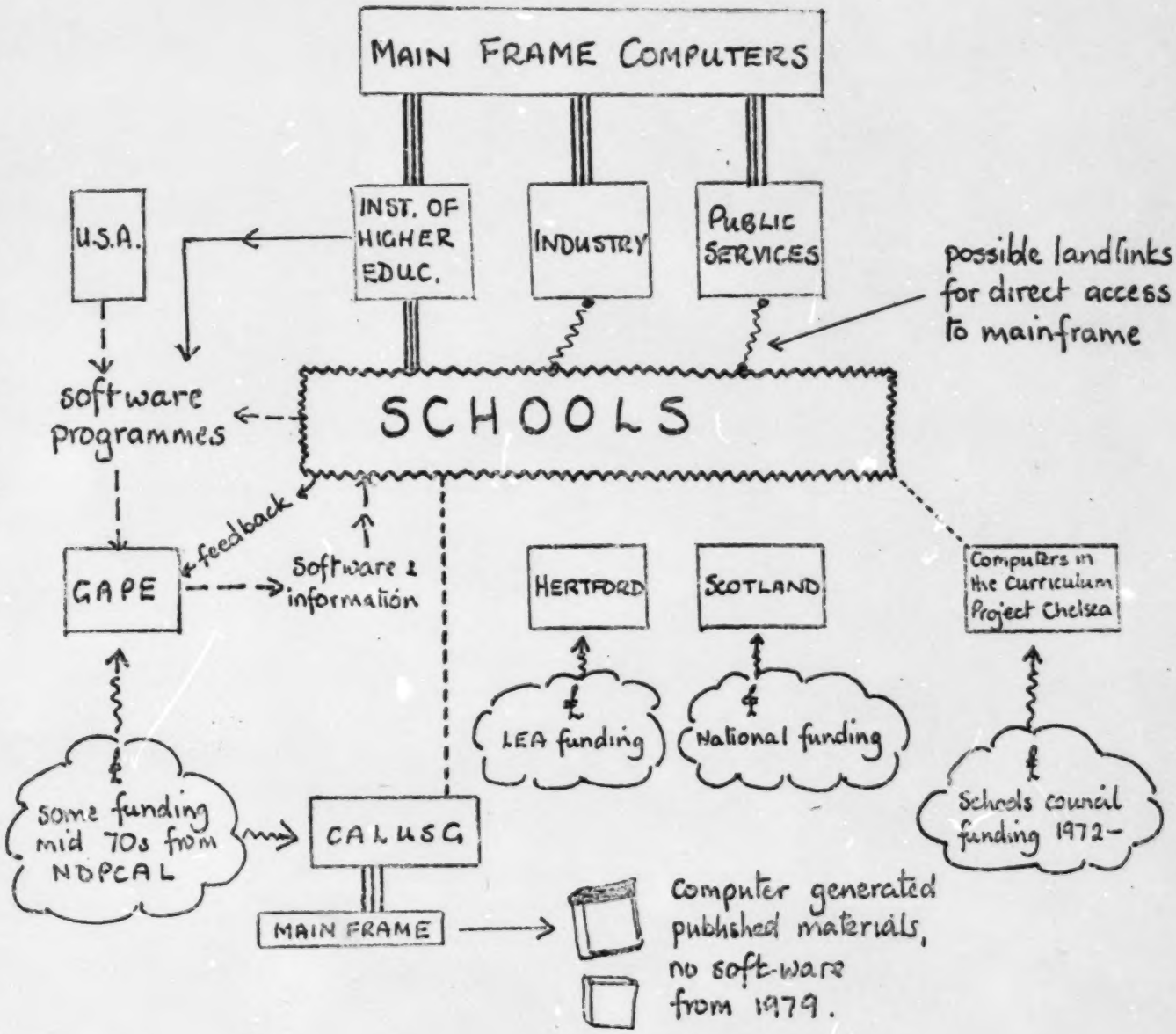
Government Initiatives

CAL in England in the 1970s could be regarded as being in the Paleotechnic era (Fig. 1). Here a few fortunate schools had links with mainframe computers usually housed in institutes of higher education such as polytechnics or colleges of education. Some disparate and isolated software ventures were under way but the majority of schools and teachers were unaware of CAL.

Around 1979 the situation began to change rapidly. In England this could be called the dawning of the Neotechnic era of CAL (Fig. 2). First and foremost this happened because of the arrival of the microcomputer with all its advantages.

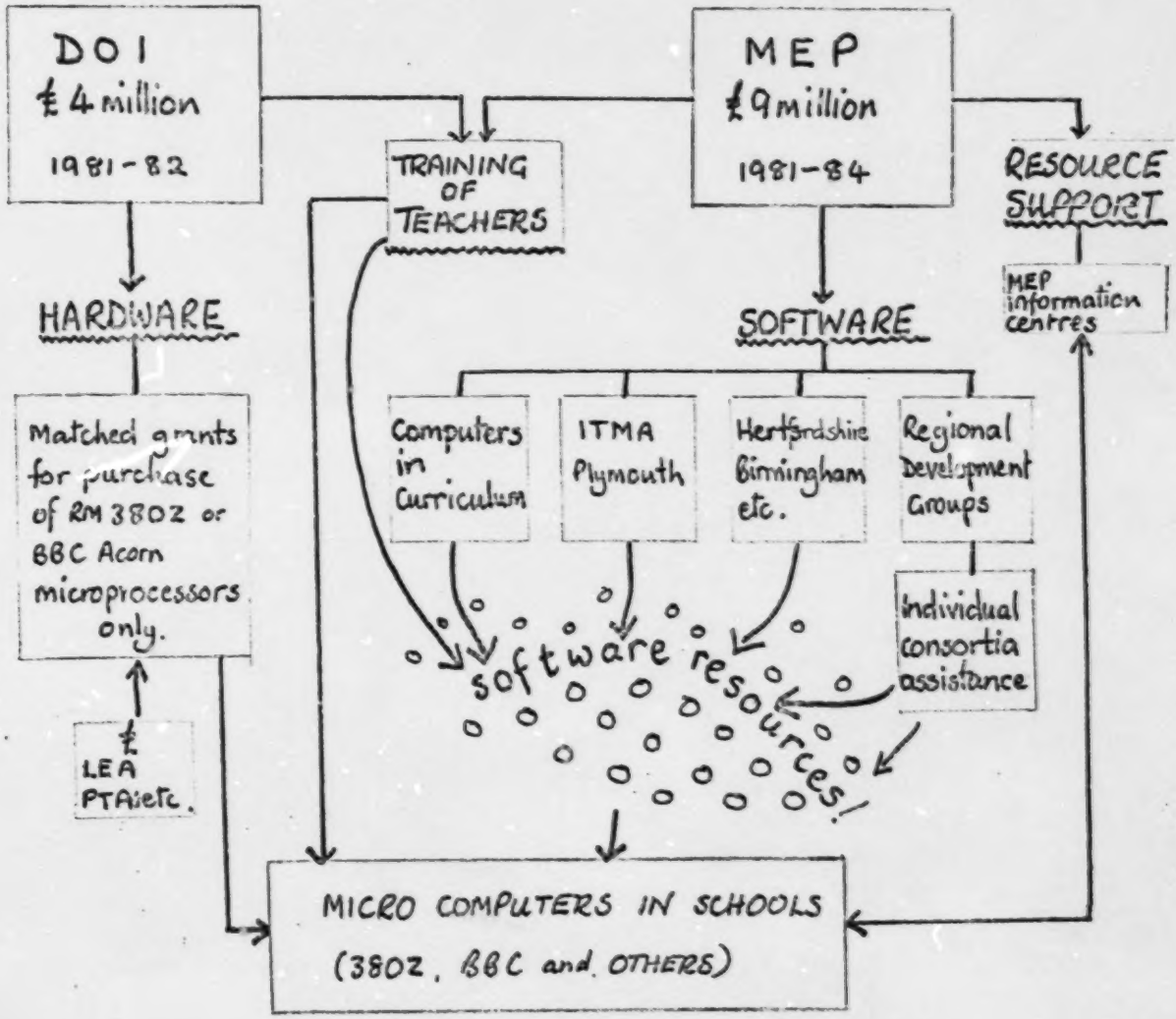
*(From now on shortened to just 'England').

Fig. I The Paleotechnic Era of Computer Assisted Learning: 1970 – 1979



G.A.P.E. Geographical Association Package Exchange.
N.D.P.C.A.L. National Development Programme in Computer Assisted Learning.
CALU.S.G. Computer Assisted Learning in Upper School Geography.
L.E.A. Local Education Authority.

Fig 2. The Neotechnic Era of Computer Assisted Learning: 1979-1984



D.O.I. Department of Industry.
M.E.P. Microelectronics Education Programme.
I.T.M.A. Investigation on Teaching with Microcomputers as an Aid.
L.E.A. Local Education Authority
P.T.A. Parent-Teacher Association.

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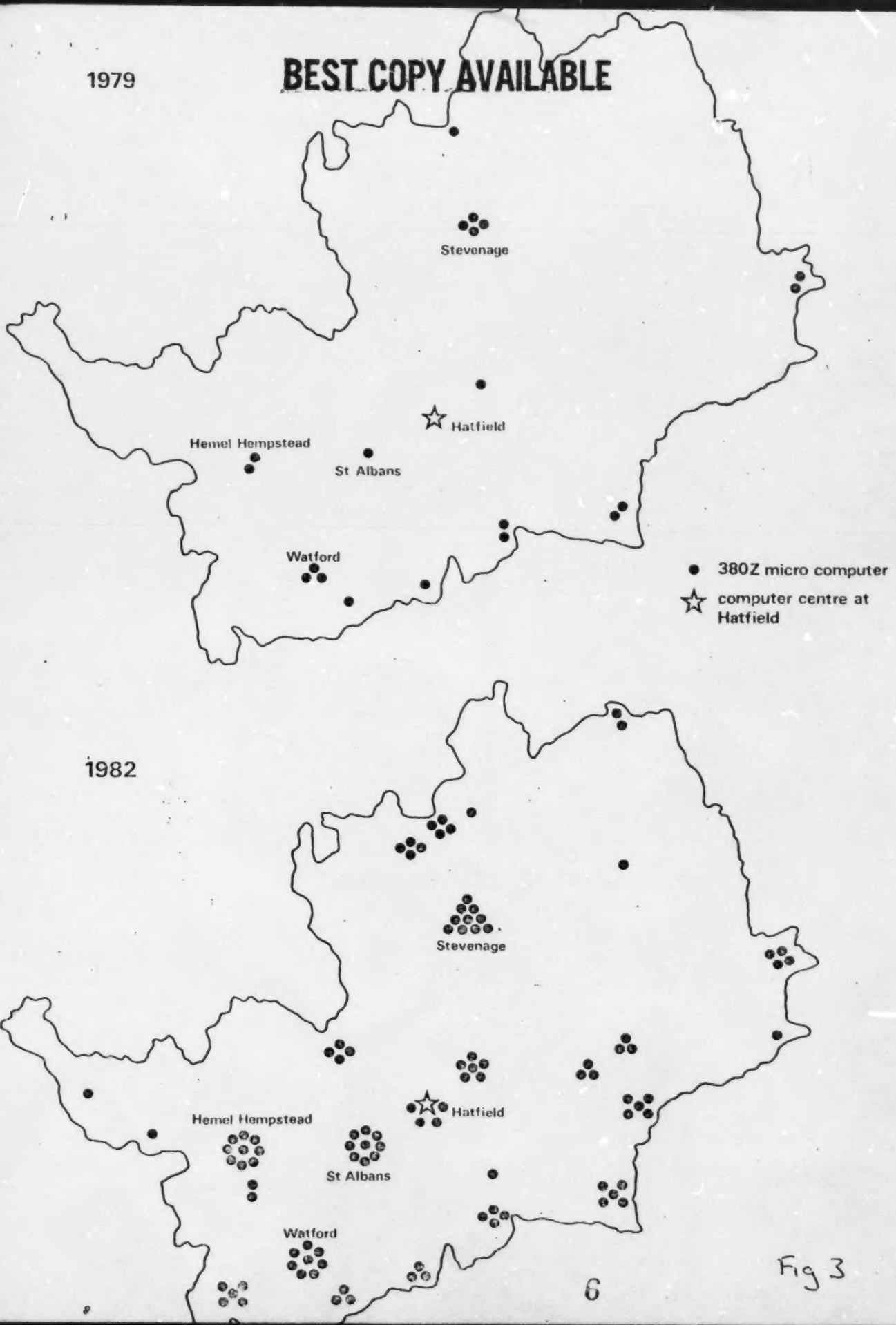

Fig 3

The second influence was the decision of the government to encourage educational computing in schools. This was done in two ways. Firstly in 1980 the Microelectronics Education Programme (MEP) was launched[4]. This supported work under three headings: curriculum development; teacher training; and resource organisation and support. The 1981-4 period of finance for MEP has recently been extended to 1986. Secondly, the Department of Industry in 1981 sponsored the 'Micros in Schools' scheme to help put micros in secondary schools in 1981-82. This has now been extended to primary schools for 1982-83. Relative to the business world the sums of money involved in these two initiatives have been trivial but in the impecunious world of education in the nineteen eighties, these were riches indeed. The intended pump priming or catalytic role of such policies has been remarkably successful and there is no doubting the momentum these two schemes have generated.

The 'Micros in Schools' Scheme has meant that by the end of 1983 every secondary school in England will have at least one micro. They will have an RML 380Z or a BBC 'B' micro each with high resolution graphics, minimum of 32K RAM and printer. The speed of acquisition has been staggering. Take for instance the county of Hertfordshire (Fig. 3). This government inspired momentum has been added to by parents, governors, the media and the business world who together impose massive pressures on head teachers to purchase micros. The author's own institution is a good example of the pace of change. In 1982 the University of London Institute of Education possessed seven microcomputers. In 1983 it now possess 35 and this pace of hardware acquisition is not unusual in the domestic market either.. A recent straw poll of a class of girls in a London comprehensive school showed that 15 out of 25 girls had micros at home. The overall position in England now and for probably two years or so will be that the dominant micros in secondary schools will be 380Z and BBC micros.

Fig 4. Locations of MEP Regional Information Centres

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The MEP Scheme has set up 14 regional information centres (Fig. 4) where vita. in service training courses are run. A key role of the Scheme has been to encourage and indeed financially support various agencies to engage in software development. These include publishers such as Longman[5], curriculum development projects such as that based at Chelsea College[6]; and other organisations such as GAPE[7]. Software publishing has indeed taken off and is less now the cottage industry it was a year ago. Sadly however, most software is still under development and not yet published.

This development activity is very great and diverse but this author has attempted to categorize types of CAL in the following ways.

Categories of CAL in History, Geography and Economics.

1. Information Handling
2. Statistical Analysis
3. Simulations
   a) Models and Systems
   b) Decision Making Exercises and Games
4. Reinforcement of knowledge, skills, ideas
5. Other uses of CAL
   a) Teaching Materials produced
   b) Electronic Blackboard
   c) Managing Resources
   d) Video/Micro Link
   e) Management of Learning

Some programs as examples of these categories

Category	Program Name and source	Subject Area	Topic
1	QUERY (AUCBE)	H,G,E	Interrogates data sets
1	LEEP (BLEA)	H,G,E	Interrogates data sets
1	SOM 51 (SLEA)	H	1851 Census data for 11 parishes
1	SCAN (ILEA)	H,G,E	Interrogates data sets
2	GSTATS (L)	H,G,E	Elementary descriptive statistics
2	DESCRIBE (NC)	H,G,E	Various statistical measures
2	SPATIAL (NC)	G	Calculates spatial statistics
3a	RUNNING THE BRITISH ECONOMY (L)	E	Effect of monetary and fiscal policies
3a	MAXPRO (L)	E	Theory of the firm
3a	DROPLET (GAPE)	G	Model of the hydrological cycle
3a	GRAVITY (L)	G	Predicting journey patterns
3a	WELF (L)	G	Social indices of deprivation
3b	PARAFFIN FILE (BP)	E	Case study of UK paraffin market
3b	RAIL (L)	H,G,E	Rival railway companies plan networks

Category	Program Name and source	Subject Area	Topic
3b	CHOICE (L)	H	Disraeli and Eastern question 1875-8
3b	JUTLAND (E)	H	Battle of Jutland
3b	FARM (L)	G,E	Making profits given weather variations
3b	ROUTE (L)	G	Motorway route planning
4	SLOPES (GAPE)	G	Slope angles-estimation and forms of transport
4	WEATHER (H)	G	Forecasting of weather
4	CONTOUR (CICP)	G	Contour map interpretation
4	CLIMATE (H)	G	Recognition of climatic types

Abbreviations for Sources of Programs

AUCBE Advisory Unit for Computer Based Education; Hatfield,Herts.AL10 8AU.
BLEA Bedfordshire Local Education Authority (LEA)
SLEA Suffolk Local Education Authority (LEA)
ILEA Inner London Education Authority
L Longman Micro Software
NC Newman College, Bartley Green,Birmingham, B32 3NT.
GAPE Geographical Association Package Evaluation, Department of Geography, University of Loughborough.
BP British Petroleum Education Unit, PO Box 5, Wetherby, West Yorkshire, LS23 7EH.
H Heinemann Computers in Education Limited, 22 Bedford Square, London, WC1B 3HH.
CICP Computers in the Curriculum Project, Chelsea College.

Abbreviations for subject areas

H History
G Geography
E Economics and Business Studies

In summary the neotechnic era of CAL (Fig. 2) has witnessed greater coordination and pace of developments in hardware acquisition; training of teachers; software development; and resource support.

CAL and The Three Social Studies Subjects

Here the author intends to give a brief pen picture of each subject and its involvement with CAL. The position with geography is best summarized in Shepherd et al (1980) and more recently in Kent (1983). Of the three subjects, geography developed CAL interests earlier and has sustained such developments on a wider front than the other two subject areas. The recent Geographical Association Bibliographic Notes (1983) indicate the richness of software now available for school use. Clearly the interactive, graphics facilities of CAL does suit modern school geography but much credit must go to the early work of GAPE[7] (David Walker) and Chelsea College[6] (Deryn Watson) Also recent school geography has engaged in quantification, model building and simulations all of which offer potentials for CAL. As with other subjects many programs are promised but not yet published and Longman alone are to publish 13 geography packs (19 programs in all) in 1983.[5] However, as yet this software activity is not matched by classroom practice (Hall et al 1982).

History on the other hand has been slow to take on this particular innovation. Two publications, one from the Historical Association (1979) and the other an issue of Teaching History (1982) best summarize the present position. The greatest enthusiasm has been shown for information handling programs which reflect the 'New History'. This recent trend encourages pupils to consider historical methods and events through the examination of source materials and evidence. Allied to this is a move towards more recent economic and social history for which much data is available to be examined and quantified.

Such work has been spearheaded by Peter Laslett at the Cambridge Centre for Population Studies and involves study of census returns, parish registers, wills, inventories, and records and so on. This data needs searching, quantifying and aggregating and information handling CAL packages are seen to have great potential here.[8]

Many history teachers regard CAL as no more than a gimmick and passing fad and are particularly scathing about CAL simulations. They see the danger of oversimplification to the point of distortion and feel such simulation suggest that certain events were inevtiable (Blow, 1982) and make the dangerous assumption that decisions were logical. Developments in artificial intelligence, and in particular Prolog [10] are described by Ennals (Forthcoming) and are either regarded as a pedagogical cul-de-sac or as one Inspector put it, 'I take a sceptical but undismissive attitude'. Many teachers share the view of Derek Turner (1982) who suggested that, 'The long term importance of the computer in the history classroom is uncertain. It cannot become clear until more software programs are available and more schools have tried and shared their experience with others'.

Cotterell (1983) reviews the state of economics and CAL and this is the most useful source until Randall's book (forthcoming) is finally published. Again much software is promised yet little has yet been produced. Running the British Economy[11] and the early Schools Council Programs[12] have enjoyed reasonable success with schools. Most programs seem to play a reinforcement role with respect to skills and/or knowledge. Some economics teachers are making a strong case for using computers to present simulations which make otherwise complex and seemingly abstract models reveal their important practical applications at a relatively early stage in an introductory course. Most software is for the 16-19 age group and as yet only few economics teachers

are making a strong case for using computers to present simulations which make otherwise complex and seemingly abstract models reveal their important practical applications at a relatively early stage in an introductory course. Most software is for the 16-19 age group and as yet only few economics teachers have ventured into CAL.

To summarize across the three subject areas, one can say that most teachers have decided against using CAL (Fig. 5) since although attitudes in general are positive there is not enough hardware or software available; teachers' awareness, knowledge and therefore confidence is limited; and no obvious green lights have come through from educational research. Most programs in use are from the mainframe (paleotechnic) generation and therefore are less sophisticated (e.g. graphics) than those which are about to be published.

Messages from Research

Sadly educational research[13] into CAL has been far outstripped by software and hardware developments. This has meant that as Deryn Watson[14] observed in April 1983, 'nearly every program that is developed is published' and could perhaps explain an ILEA[15] inspector's remark that "80 per cent of programs are garbage". The pressure on developers is to develop not to carefully evaluate CAL developments as to their learning and attitudinal implications. Quality control therefore leaves much to be desired and advocates of CAL are in danger of alienating a good number of, at present, favourably inclined teachers. Not only are classroom teachers hungry for evaluative information on CAL but key decision takers in government need such data equally urgently. In England for instance the new government will need such data to enable a decision about extending MEP beyond 1986.

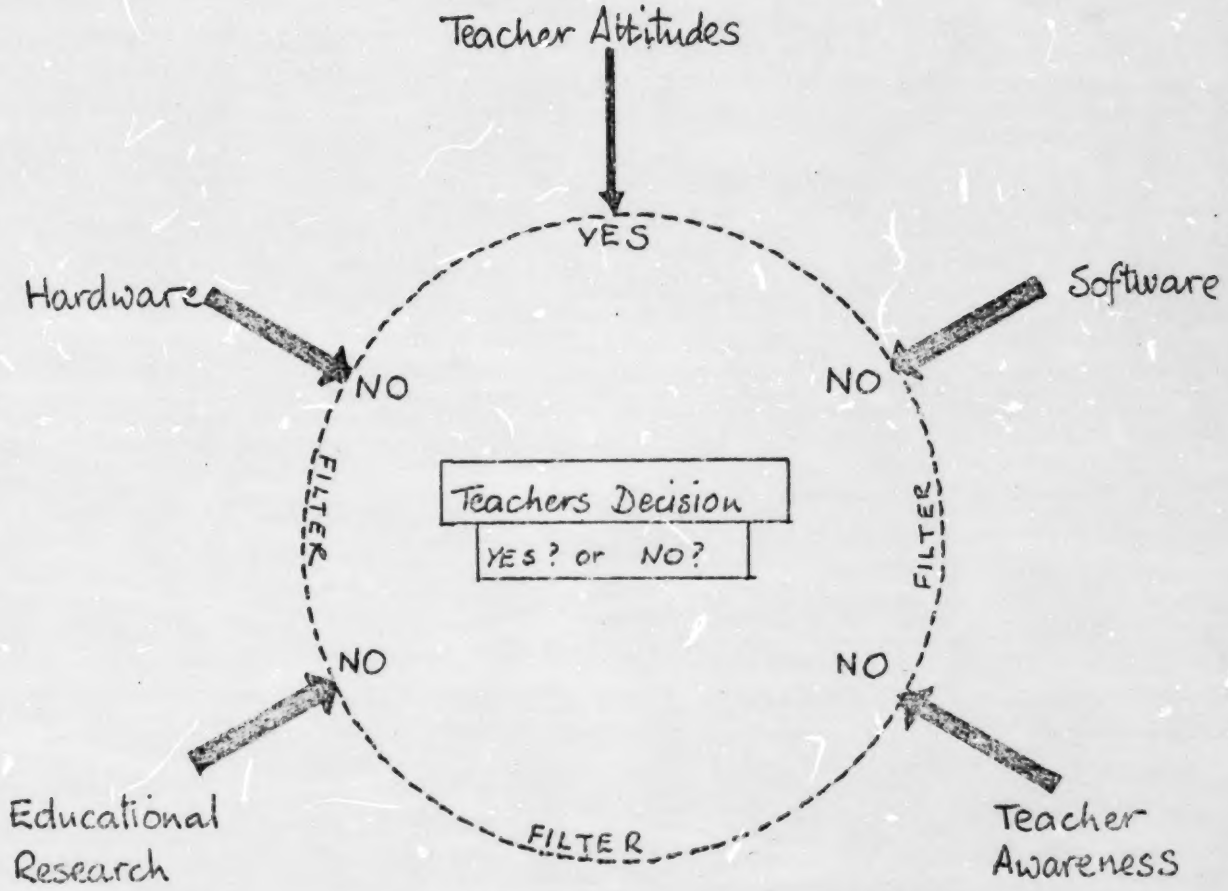

Fig 5 To Use CAL or not?
(The influences on a history, geography or economics teacher in 1983)

Some research work has been conducted but most is ongoing. Examples are given at the end of this paper of research into CAL geography[16] most of which is to be completed. Some important messages are coming through to teachers and software developers. Four examples are selected here; three from research into the classroom. Robinson's research (1982) suggests that less able pupils may have negative attitudes to CAL prior to such a lesson yet after their experience their negative attitudes may harden still further. This corresponds with Wood's findings (1983) that 'able, confident students may dominate while less able members of the group may opt out of the learning process and find it easy to do so'. The second message comes from Hassell's research (1982) in which he found noticeable learning gains and greater involvement by pupils taught by more student-centred styles of teaching. The third message comes from Hall et al (ongoing) whose work in classrooms suggests that teachers start off by using the 'gatekeeper' approach (as an electronic blackboard) and as experience and confidence is gained they move to the 'partnership model fig. 6.

Finally, the work of Kent (ongoing) points to massive inertia in the educational system in response to the CAL innovation. A 1982 questionnaire to all humanities and geography advisers pointed to considerable ignorance, lack of awareness and involvement in CAL. This from key facilitators for curriculum change! As Atherton (1980) put it ".... the effort required is small and the benefits seem obvious.....but the small effort needed to set up the computer and perhaps a TV screen may be too high a price for many teachers".

Crystal ball gazing

Inevitable dangers enshrine prediction in such a volatile part of the educational world! However some concluding comments will be made by the author.

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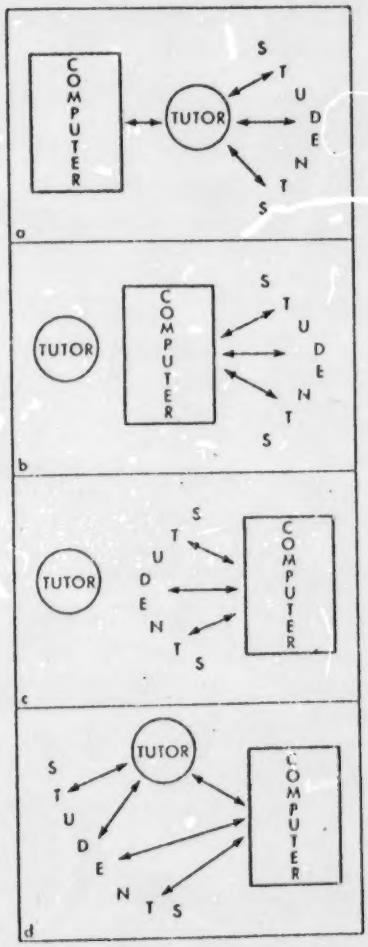

Figure 6 Four models of the student-teacher-computer relationship: (a) the 'gatekeeper' model; (b) the 'barrier' model; (c) the 'diversionary' model; and (d) the 'partnership' model. (Shepherd, et al., 1980).

Firstly, the success of inservice and initial training, will be critical to the success of CAL. As Esterson (1983) suggested, 'If we don't have adequately trained teachers and a sensible appreciation of the potential of the equipment, it could just become a toy for playing space invaders on a wet Friday afternoon'. Secondly coordination of software and hardware developments will be vital since undoubtedly history, geography and economics teachers find CAL developments confusing. In England the MEP regions (Fig.4) in theory should play a vital role in coordinating software, information and training for teachers. It remains to be seen how successful they will be.

Finally it is hoped that practitioners in economics, history and geography education get together to decide on future software priorities. Happily in England the MEP/DES has already done this for geography in England[17] and the suggested directions include: graphical and diagrammatic data base programs; greater use of graphics tablets and the potential of Landsat; further work on programs developing mapwork skills and linked with the Logo Turtle; integration of micro with videodisc; and further consideration of programs for fieldwork. It is to be hoped decision makers take note of these suggestions and equally as important organise similar conferences for history and economics teaching.

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Hall, D.. Kent, W.A., & Wiegand, P. (1982) 'Geography Teaching and Computers' Teaching Geography 7, (3) January

Hassell, D. (1982) 'Teacher Style and CAL in geography' Unpublished M.A. dissertation, University of London Institute of Education.

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Randall, K. (forthcoming) Microcomputers in Teaching Economics. Longman

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Shepherd, I.D.H., Cooper, Z. A. & Walker, D.R.F. (1980) Computer Assisted Learning in Geography. CET with the Geographical Association.

Teaching History (1982) June, No. 33 with various articles on CAL in history.

Turner, D. (1982) 'Computer Assisted Learning in History' in Teaching History, June No. 33.

Wood, K. R. J. (1982) An analysis and evaluation of computer materials developed for use in the economics curriculum. Unpublished M.A. dissertation, University of London Institute of Education.

NOTES

1. The Scottish Microelectronics Development Programme (SMDP) was established in 1980 by the government with David Walker as its Director. The SMDP is based at: Dowanhill, 74 Victoria Crescent Road, Glasgow. G12 9JN

2. In Britain primary schools are usually for ages 5-11 and secondary schools for ages 11-18.

3. Subsumed by this umbrella term are for example:

   CAI Computer assisted instruction

   CAT Computer assisted training

   CML Computer managed learning

   CMI Computer managed instruction

   CBL Computer based learning

4. Microelectronics Education Programme. The Strategy. Department of Education and Science. April 1981

5. Longman Micro Software

6. Computers in the Curriculum Project based at Chelsea College, University of London.

7. GAPE is partly an organisation for developing geography software and is based at the Department of Geography, Loughborough University. Since 1981 several programs have been developed with MEP support.

8. For example, Micro QUERY developed by the Advisory Unit for Computer Based Education at Hatfield and SO M 51 developed by Beverley Labbett for 11 Suffolk parishes.

9. For instance the RAISING OF THE MARY ROSE developed jointly by the Mary Rose Trust and the BBC and CAMPAIGN, the progress of the English army before Crecy and developed by Chelsea College.

10. The Logic Programming group of the Department of Computing at Imperial College, London have been investigating the teaching of logic as a computer language (PROLOG) for children.

11. RUNNING THE BRITISH ECONOMY developed at Herriott Watt University is now published by Longman and is the basis for an annually held schools competition.

12. Published in 1978 first by Arnold now by Longman, this package consists of 10 programs including those on elasticity of demand, the national income multiplier, fiscal policy, credit creation and monetary policy.

Notes contd..

13. Here the author takes Mouly's definition of research as 'Best conceived as the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data. It is a most important tool for advancing knowledge, for promoting progress and for enabling man to relate more effectively to his environment, to accomplish his purposes and to resolve his conflicts'.

    Mouly, G.J. (1978) Educational Research: the Art and Science of Investigation, Allyn & Bacon, Boston.

14. International Geographical Union conference on CAL in Geography held at the University of London Institute of Education, April 10-13 1983.

15. Inner London Education Authority (ILEA). The inspector involved was Derek Esterson, ILEA's inspector for computing.

16. Research studies on CAL geography:-

    Abbott, S.J. (1980) 'Computer Assisted Learning and Geography' Unpublished Dissertation in partial fulfillment of B.Sc. degree University of Technology, Loughborough.

    Burdett, F. (ongoing) 'The adoption of microcomputers by Local Education Authorities.'

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    Midgley, H. (ongoing) 'Evaluation of GAPE software'.

    Ramsay, A.P. (ongoing) 'The evaluation and development of certain CAL geography units'.

Notes contd..

Robinson, C. (1982) 'An evaluation of pupil attitudes towards CAL in geography'. Unpublished M.A. dissertation, University of London Institute of Education.

Watson, D. (ongoing) 'Simulations and CAL in the humanities'.

Yaffe, L.K. (ongoing) 'Microcomputers in geography and history teaching. Aspects of initial and in-service courses'.

17. MEP and DES (Department of Education and Science) held a conference between May 3-6 1983 at Pendley Manor, Hertfordshire, for educators in geography, mathematics and science. The objectives were to provide government with guidelines for possible future software/curriculum directions.